

REMARKS

The Examiner is thanked for the thorough examination of this application. The Office Action has, however, continued to reject all claims 1-22. Claims 1, 15, and 18 have been amended to recite a transmissive polarizer for the visible spectrum. Support for this limitation can be found at least on page 4, lines 11-14 of the specification and in Figures 6, 7, and 9. Applicants submit that no new matter has been added. Applicants respectfully request reconsideration and withdrawal of the rejections based on the amendments and remarks set forth herein.

Claim Rejections- 35 USC 103

Claims 1, 2, 6-9, 12-16, 18, 19, and 22 stand rejected under 35 U.S.C. 103(a) as allegedly unpatentable over Zhaoning Yu, et al (CLEO '99). Applicants respectfully traverse the rejections made by the Examiner for at least the reasons discussed below.

Yu et al fail to disclose a transmissive polarizer

Independent claims 1, 15, and 18 are amended to expressly define a transmissive polarizer for the visible spectrum. In contrast, Yu et al (CLEO '99) teach away from this claimed feature by disclosing a reflective polarizer. In this regard, Applicants note paragraphs 2 and 4 of Yu et al (CLEO '99), which state:

*In this study, we demonstrate a polarizing reflector with double-layer subwavelength metal grating structure...
The wavelength-dependent reflection was also measured with a monochromator, the result is shown in FIG. 3, which indicates that the reflection polarizer has a bandwidth for the wavelength from 500nm to 800nm.*

The reflectivity measurement given in FIG.3 of Yu et al (CLEO '99) also conforms to a reflective polarizer. Yu et al indeed, recite the use of a silica substrate, however, given the high reflectivity (0.6-0.7) in FIG. 3 of Yu et al (CLEO '99), one of ordinary skill in the art would readily conclude that the substrate is not transparent. Applicants therefore submit that the substrate used in Yu et al may be a bare "silicon" wafer, which easily undergoes oxidation to form silica (called "native oxide") on exposed surfaces. Regardless of this, Yu et al is directed to a *reflective* polarizer, so consequently there is no motivation and no reasonable expectation of success to use a transparent substrate, as required by the claimed embodiments. In fact, using a transparent substrate would render the reflective polarizer of Yu et al unsatisfactory for its intended purpose (*i.e.*, reflection).

MPEP 2141.02 reads in part.

A prior art reference must be considered in its entirety, *i.e.*, as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983).

As Yu et al expressly teach a reflective polarizer and the reflectivity thereof is clearly different from a transparent substrate, the claimed transmissive polarizer is novel and non-obvious in view of Yu et al. For at least this reason, the rejections should be withdrawn.

The claimed invention realizes unexpected results

As a separate and independent basis for the patentability of the pending claims, Applicants submits that the claimed invention provides unexpected superior extinction ratio in view of the Yu et al.

Although Yu et al disclose a vertical distance of 125nm between two metal layers and identify the vertical distance as a result-effective variable, the superior extinction ratio achieved by vertical distance not greater than 100nm is unexpected.

Applicants respectfully direct the Examiner's attention to Figs. 7B and 8B and the related text of the present application. The wire grid polarizer with 30nm vertical spacing (Fig. 7B) showed greatly improved transmittance T_{TM} over that with 130nm vertical spacing (Fig. 8B, very close to Yu et al's 125nm). Furthermore, the efficiency of T_{TM} is greater than 70% over the visible spectrum from 0.5 μ m. The comparison of the transmittance efficiency between two vertical distances is tabulated below:

Vertical distance	Red(610nm)	Green(550nm)	Blue(470nm)
30nm	70%	75%	85%
130nm	50%	30%	45%

Accordingly, the vertical distance of not greater than 100nm provides (1) unexpected high transmittance T_{TM} and (2) uniformly high extinction ratio over full visible spectrum, as compared to that greater than 100nm. The above advantages achieved by the invention are unappreciated and unexpected from the teachings of Yu et al. Note that, as Yu et al is directed to a reflective polarizer, the transmittance efficiency is never discussed or contemplated (in Yu et al).

For at least this additional reason, claims 1, 15, and 18 are novel and non-obvious over the cited references. Insofar as claims 2-14, 16-17, and 19-22 depend from claims 1, 15 and 18, respectively, these claims are also allowable at least by virtue of their dependency.

Claims 4, 5, 10, 11, and 21 stand rejected under 35 U.S.C 103(a) as allegedly unpatentable over Yu et al (CLEO '99) in view of Garvin et al (U.S. Patent 4,289,381).

Claims 4, 5, 10, 11, and 21 ultimately depend from independent claims that include the aforementioned elements that is novel and non-obvious over the cited references, and thus these claims are also in condition for allowance for at least that reason.

Claims 3, 17, and 20 stand rejected under 35 U.S.C 103(a) as allegedly unpatentable over Yu et al (CLEO '99) in view of J.J. Kuta et al (JOSA A).

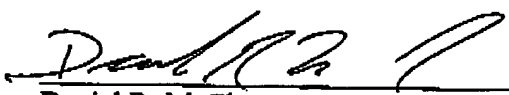
Claims 3, 17, and 20 ultimately depend from independent claims that include the aforementioned elements that is novel and non-obvious over the cited references, and thus these claims are also in condition for allowance for at least that reason.

CONCLUSION

In view of the foregoing, it is believed that all pending claims are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

No fee is believed to be due in connection with this amendment and response to Office Action. If, however, any fee is believed to be due, you are hereby authorized to charge any such fee to deposit account No. 20-0778.

Respectfully submitted,

By: 
Daniel R. McClure
Registration No. 38,962

Thomas, Kayden, Horstemeyer & Risley, LLP
100 Galleria Pkwy, NW
Suite 1750
Atlanta, GA 30339
770-933-9500